We claim:

1. A microfluidic device comprising:

a card shaped substrate having first and second opposing faces;

one or more microvolumes at least partially defined by a first face of the card shaped substrate; and

one or more grooves at least partially defined by a second face of the card shaped substrate;

wherein a lateral footprint of at least a portion of the one or more grooves overlaps with a lateral footprint of at least one of the one or more microvolumes.

2. A microfluidic device according to claim 1, wherein the one or more grooves are sufficiently deep relative to the second face of the substrate within the overlapping lateral footprint that when the portion of the microvolume within the overlapping lateral footprint comprises a crystallization sample and an x-ray beam traverses the card shaped substrate at the overlapping lateral footprint, the portion of the microvolume that the x-ray beam traverses contains at least half as many electrons as is contained in the substrate where the x-ray beam traverses.

3. A microfluidic device according to claim 1, wherein the one or more grooves are sufficiently deep relative to the second face of the substrate within the overlapping lateral footprint that when the portion of the microvolume within the overlapping lateral footprint comprises a crystallization sample and an x-ray beam traverses the card shaped substrate at the overlapping lateral footprint, the portion of the microvolume that the x-ray beam traverses contains at least as many electrons as is contained in the substrate where the x-ray beam traverses.

4. A microfluidic device according to claim 1, wherein the one or more grooves are sufficiently deep relative to the second face of the substrate within the overlapping lateral footprint that when the portion of the microvolume within the overlapping lateral footprint comprises a crystallization sample and an x-ray beam traverses the card shaped substrate at the overlapping lateral footprint, the portion of the microvolume that the x-ray beam traverses contains at least three times as many electrons as is contained in the substrate where the x-ray beam traverses.

5. A microfluidic device according to claim 1, wherein the one or more grooves are sufficiently deep relative to the second face of the substrate within the overlapping lateral footprint that when the portion of the microvolume within the overlapping lateral footprint comprises a crystallization sample and an x-ray beam traverses the card shaped substrate at the overlapping lateral footprint, the portion of the microvolume that the x-ray beam traverses contains at least five times as many electrons as is contained in the substrate where the x-ray beam traverses.

6. A microfluidic device according to claim 1, wherein the one or more grooves are sufficiently deep relative to the second face of the substrate within the overlapping lateral footprint that when the portion of the microvolume within the overlapping lateral footprint comprises a crystallization sample and an x-ray beam traverses the card shaped substrate at the overlapping lateral footprint, the portion of the microvolume that the x-ray beam traverses contains at least ten times as many electrons as is contained in the substrate where the x-ray beam traverses.

7. A microfluidic device according to claim 1, wherein the one or more microvolumes comprise at least one lumen.

8. A microfluidic device according to claim 7, wherein the groove has a longitudinal axis that is aligned with a longitudinal axis of the lumen adjacent the overlapping lateral footprint.

9. A microfluidic device according to claim 7, wherein the groove has a longitudinal axis that is perpendicular to a longitudinal axis of the lumen adjacent the overlapping lateral footprint.

10. A microfluidic device according to claim 1, wherein the one or more microvolumes comprise at least one lumen with a cross sectional diameter of less than 2.5 mm.

11. A microfluidic device according to claim 1, wherein the one or more microvolumes comprise at least one lumen with a cross sectional diameter of less than 1 mm.

12. A microfluidic device according to claim 1, wherein the one or more microvolumes comprise at least one lumen with a cross sectional diameter of less than 500 microns.

13. A microfluidic device according to claim 1, wherein the one or more microvolumes comprise at least one microchamber.

14. A microfluidic device according to claim 1, wherein the substrate comprises a member of the group consisting of polymethylmethacrylate, polycarbonate, polyethylene terepthalate, polystyrene, styrene copolymers, glass, and fused silica.

15. A microfluidic device according to claim 1, wherein the substrate is optically transparent.

16. A microfluidic device comprising:

a card shaped substrate having first and second opposing faces;

a plurality of microvolumes at least partially defined by a first face of the card shaped substrate; and

one or more grooves at least partially defined by a second face of the card shaped substrate;

wherein a lateral footprint of at least a portion of the one or more grooves overlaps with lateral footprints of plurality of microvolumes.

17. A method for use with a microfluidic device, the method comprising:

performing an experiment in a microfluidic device comprising a card shaped substrate having first and second opposing faces, one or more microvolumes at least partially defined by a first face of the card shaped substrate; and one or more grooves at least partially defined by a second face of the card shaped substrate; wherein a lateral footprint of at least a portion of the one or more grooves overlaps with a lateral footprint of at least one of the one or more microvolumes; and

performing a spectroscopic analysis within the overlapping lateral footprint.

18. A method according to claim 17, wherein the spectroscopic analysis is selected from the group consisting of Raman, UV/VIS, IR, x-ray spectroscopy, polarization, and fluorescent.

19. A method according to claim 17, wherein the spectroscopic analysis is x-ray spectroscopy.

20. A method according to claim 19, wherein the x-ray spectroscopy is x-ray diffraction.

21. A method according to claim 17, wherein the spectroscopic analysis involves an x-ray traversing the microfluidic device.

22. A method according to claim 21, wherein the groove is sufficiently deep relative to the second face of the substrate within the overlapping lateral footprint that when the portion of the microvolume within the overlapping lateral footprint comprises a crystallization sample and an x-ray beam traverses the card shaped substrate at the overlapping lateral footprint, the portion of the microvolume that the x-ray beam traverses contains at least half as many electrons as is contained in the substrate where the x-ray beam traverses.

23. A method according to claim 21, wherein the groove is sufficiently deep relative to the second face of the substrate within the overlapping lateral footprint that when the portion of the microvolume within the overlapping lateral footprint comprises a crystallization sample and an x-ray beam traverses the card shaped substrate at the overlapping lateral footprint, the portion of the microvolume that the x-ray beam traverses contains at least as many electrons as is contained in the substrate where the x-ray beam traverses.

24. A method according to claim 21, wherein the groove is sufficiently deep relative to the second face of the substrate within the overlapping lateral footprint that when the portion of the microvolume within the overlapping lateral footprint comprises a crystallization sample and an x-ray beam traverses the card shaped substrate at the overlapping lateral footprint, the portion of the microvolume that

the x-ray beam traverses contains at least three times as many electrons as is contained in the substrate where the x-ray beam traverses.

25. A method according to claim 21, wherein the groove is sufficiently deep relative to the second face of the substrate within the overlapping lateral footprint that when the portion of the microvolume within the overlapping lateral footprint comprises a crystallization sample and an x-ray beam traverses the card shaped substrate at the overlapping lateral footprint, the portion of the microvolume that the x-ray beam traverses contains at least five times as many electrons as is contained in the substrate where the x-ray beam traverses.

26. A method according to claim 21, wherein the groove is sufficiently deep relative to the second face of the substrate within the overlapping lateral footprint that when the portion of the microvolume within the overlapping lateral footprint comprises a crystallization sample and an x-ray beam traverses the card shaped substrate at the overlapping lateral footprint, the portion of the microvolume that the x-ray beam traverses contains at least ten times as many electrons as is contained in the substrate where the x-ray beam traverses.

27. A method according to claim 17, wherein the experiment is a crystallization.

28. A method according to claim 17, wherein the experiment is a crystallization of a biomolecule.

29. A method according to claim 17, wherein the experiment is a crystallization of a molecule at least 500MW.

30. A method according to claim 17, wherein the experiment is a crystallization of a protein.

31. The method according to claim 17 wherein the material to be crystallized is selected from the group consisting of viruses, proteins, peptides, nucleosides, nucleotides, ribonucleic acids, deoxyribonucleic acids.

32. The method according to claim 17 wherein the material to be crystallized contains at least two or more materials selected from the group consisting of

viruses, proteins, peptides, nucleosides, nucleotides, ribonucleic acids, deoxyribonucleic acids, small molecules, drugs, putative drugs, inorganic compounds, metal salts, organometallic compounds and elements.

33. A method according to claim 17, wherein the one or more microvolumes comprise at least one lumen with a cross sectional diameter of less than 2.5 mm.

34. A method according to claim 17, wherein the one or more microvolumes comprise at least one lumen with a cross sectional diameter of less than 1 mm.

35. A method according to claim 17, wherein the one or more microvolumes comprise at least one lumen with a cross sectional diameter of less than 500 microns.

36. A method for use with a microfluidic device, the method comprising:

performing an experiment in a microvolume of a microfluidic device; and

performing a spectroscopic analysis using an x-ray beam that traverses the microfluidic device such that material within the microfluidic device that the x-ray beam traverses contains at least as many electrons as is otherwise traversed when the x-ray beam traverses the microfluidic device.

37. A method according to claim 36, wherein the material within the microfluidic device that the x-ray beam traverses contains at least three times as many electrons as is otherwise traversed when the x-ray beam traverses the microfluidic device.

38. A method according to claim 36, wherein the material within the microfluidic device that the x-ray beam traverses contains at least five times as many electrons as is otherwise traversed when the x-ray beam traverses the microfluidic device.

39. A method according to claim 36, wherein the material within the microfluidic device that the x-ray beam traverses contains at least ten times as many electrons as is otherwise traversed when the x-ray beam traverses the microfluidic device.

40. A method according to claim 36, wherein the experiment is a crystallization.

41. A method according to claim 36, wherein the experiment is a crystallization of a biomolecule.

42. A method according to claim 36, wherein the experiment is a crystallization of a protein.

43. A method according to claim 36, wherein the material to be crystallized is selected from the group consisting of viruses, proteins, peptides, nucleosides, nucleotides, ribonucleic acids, deoxyribonucleic acids.

44. A method according to claim 36, wherein the material to be crystallized contains at least two or more materials selected from the group consisting of viruses, proteins, peptides, nucleosides, nucleotides, ribonucleic acids, deoxyribonucleic acids, small molecules, drugs, putative drugs, inorganic compounds, metal salts, organometallic compounds and elements.

45. A method according to claim 36, wherein the microvolume comprises is a lumen.

46. A method according to claim 36, wherein the microvolume comprises is a lumen with a cross sectional diameter of less than 2.5 mm.

47. A method according to claim 36, wherein the microvolume comprises is a lumen with a cross sectional diameter of less than 1 mm.

48. A method according to claim 36, wherein the microvolume comprises is a lumen with a cross sectional diameter of less than 500 microns.

49. A method according to claim 36, wherein the microfluidic device comprises a card shaped substrate.